

PROCEEDINGS
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NEW RECENT INDIAN CRINOIDS.

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A second collection of recent crinoids received for study from the Indian Museum, consisting mostly of specimens taken in deep water, includes a rather large number of exceedingly interesting new forms, of which it appears advisable to publish preliminary diagnoses. Among the many important discoveries made by the *Investigator*, none is more gratifying than the finding of *Bathyrinus* in the Indian Ocean; of the two forms obtained, one, the largest recent species belonging to the family Bourguetierinidæ yet known, is related to a species previously dredged only in the far eastern tropical Pacific, while the other resembles most closely the remarkable form from the eastern Atlantic described by Professor Perrier as *Ilyocrinus recuperatus*, a species so peculiar that he was inclined to regard it as a possible monstrosity; these are both so similar to the aberrant *Apiocrinus recubariensis* of Crema (referred by Dr. Bather to *Millericrinus*) as to suggest that that species should best be referred to *Bathyrinus*.

The species diagnosed herein will be fully described and figured in one of the series of monographs published by the Indian Museum dealing with the fauna of the Indian Ocean.

FAMILY COMASTERIDÆ.

GENUS COMATULA Lamarek.

Comatula micraster sp. nov.

Type.—Cat. No. Z. E. V. 825, Indian Museum; Andaman Islands; 60 fathoms.

Centro-dorsal rounded-pentagonal, flush with, or very slightly raised above, the dorsal surface of the radials, without cirri.

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Radials short, trapezoidal, four or five times as broad as long; 1 Br₁ and 2 united by syzygy, the syzygial pair being about twice as broad as long; 1 Br₁ almost entirely or quite united laterally; 1 Br₂ free laterally.

Ten arms 50 mm. to 65 mm. long, resembling, with the pinnules, those of *C. pectinata*.

GENUS COMASTER L. Agassiz.*

Comaster parvus sp. nov.

Type.—Cat. No. Z. E. V. 833, Indian Museum; Andaman Islands; 53 fathoms.

Cirri XIII-XVIII, 10-11, 8 mm. long, arranged in a single or partially double row on a rather thick discoidal centro-dorsal.

Ends of the basal rays visible as prominent tubercles in the angles of the calyx; radials projecting slightly beyond the edge of the centro-dorsal; 1 Br₁ very short and band-like, just in contact basally but widely diverging so that their lateral edges are separated by a broad shallow U-shaped gap; 1 Br₂ (axillary) triangular, twice as broad as long, the anterior angle very acute; II Br 4 (3 + 4), widely separated; III Br 2 (1 + 2); IV Br 2 (1 + 2), developed interiorly in reference to the II Br series, but seldom present.

Forty arms 60 mm. to 70 mm. long resembling, with the pinnules, those of the other small species of the genus.

Mouth central or sub-central; anal tube small, sub-central or marginal; disk naked.

FAMILY HIMEROMETRIDÆ.

Mariametra gen. nov.

Genotype.—*Himerometra subcarinata* A. H. Clark, 1908.

The form which I described under the name of *Himerometra subcarinata* differs markedly from all the other species in the genus *Dichrometra*, where I had tentatively placed it, in having a delicate narrow carinate line in the middle of the dorsal surface of the division series and first two brachials, and in having the sides of the division series thickly covered with fine granulations forming a triangular figure in each interradial area, with the apex at about the level of the last axillary, something similar to the ornamentation found in certain species of *Crinometra*. There are also differences in the cirri and in the pinnules, and the surface of the disk adjacent to the ambulacra is strongly plated. It did not seem wise to create a genus for this single aberrant species, as it was then impossible to judge of the value of the characters exhibited, they not being met with in any other species of the Himerometridæ. The Indian collection, however, contains another species possessing the same general features which separate *subcarinata* from the remaining species of *Dichrometra*, though differing widely in its details, and I have now no hesitation in creating a genus for these two peculiar forms, which I propose to call *Mariametra*.

* Cf. *antea*, p. 87.

Mariametra margaritifera sp. nov.

Type.—Cat. No. 57B., Indian Museum; two miles off Great West Torres Islands.

Centro-dorsal rather small, discoidal.

Cirri XXI, 30–34, 15 mm. long, the outer joints with long dorsal spines.

Disk thickly covered with small calcareous plates along the ambulacra and on the anal tube, with scattering plates in the interambulacral areas; no plating after the last axillary.

Radials short, about six times as broad as long, gently convex proximally and correspondingly concave distally; 1 Br₁ short, oblong, somewhat over four times as broad as long, in lateral apposition and slightly flattened; 1 Br₂ (axillary) short, almost or quite triangular, two and one-half or three times as broad as long, in apposition laterally; 11 Br 2; radials and portion of centro-dorsal above the proximal row of cirrus sockets evenly and thickly covered with high small tubercles resembling those on the dorsal pole of the centro-dorsal, this tubercular modification of the dorsal surface of the joints extending distally in the interradian angles, occupying the lateral third of the 1 Br₁ and the 1 Br₂ and of the 11 Br series, thence diminishing in width and disappearing on the second brachial; inner edges of the 11 Br series similarly modified; 1 Br series with a narrow and low, but prominent, tubercular keel or row of tubercles; this is much less marked or altogether absent on the 11 Br series and first two brachials, though sometimes traceable to the lowest of the triangular brachials; 1 Br and 11 Br series and proximal oblong brachials with prominently everted dentate proximal and distal edges; as the brachials become wedge-shaped and triangular, the everted dentate ends become gradually lower, transforming into a rather prominent finely spinous overlap which slowly dies away distally.

Eighteen arms (in the type) apparently 30 mm. to 35 mm. long, the proportions of the brachials being approximately as in *M. subcarinata*.

P₁ 4 mm. long, moderately stout basally, but tapering rather rapidly in the proximal half and slender distally, with twelve joints, the first three squarish, the following increasing in length and becoming about three times as long as broad distally; P₂ 6 mm. long, slender, but stouter than P₁ and somewhat stiffened, with about sixteen joints, at first squarish, but becoming three or four times as long as broad distally; P₃ similar to P₂ and about the same size; following pinnules 3 mm. long, small and weak; distal pinnules delicate, 5 mm. long.

FAMILY COLOBOMETRIDÆ.

GENUS CENOMETRA A. H. Clark.

Cenometra herdmani sp. nov.

Antedon bella (not of Hartlaub) 1904. CHADWICK, in HERDMAN, Report Ceylon Pearl Oyster Fisheries, Suppl. Rep. XI, p. 155.

Type.—Cat. No. $\frac{8418}{9}$, Indian Museum; Ganjam Coast, Bay of Bengal; 12 fathoms.

This species resembles *C. unicornis* in general appearance, but is more

slender, especially the cirri. It may at once be distinguished from all the other species of the genus by the paired dorsal tubercles on the cirrus joints which are small and situated very close together; and by the shortness and comparative slenderness of P_2 , which is very slightly, when at all, longer than P_1 ; P_2 also has comparatively few joints, these numbering less than twenty.

Cenometa insueta sp. nov.

Type.—Cat. No. 2311., Indian Museum; Arrakan coast, Burma.

With the arm and pinnule structure of the preceding, and the same slenderness of build, this form has the paired dorsal tubercles of the cirrus joints situated with their apices much further apart, about two-thirds the transverse diameter of the joint faces instead of less than one-half as in *C. herdmani*.

GENUS CYLLOMETRA A. H. Clark.

Cyllometra soluta sp. nov.

Type.—In collection of Indian Museum; Straits of Ormuz, at entrance to Persian Gulf; 48–49 fathoms.

This species in its general appearance resembles *C. manca* from the Philippine Islands.

Centro-dorsal thin-discoidal, the bare polar area 2 mm. in diameter.

Cirri XVI, 21–28, 11 mm. to 13 mm. long, the fourth or fifth and following joints subequal, about as long as broad; third or fourth and following joints with produced distal ends, which soon transform into prominent paired dorsal spines, becoming single median dorsal spines on the terminal five or six.

Ray and arm structure as in *C. manca* and *C. albopurpurea*.

Fourteen to sixteen arms 55 mm. long.

P_a absent; P_1 small and very slender, 3 mm. long, with about twelve joints; P_2 the largest and longest on the arm, 11 mm. long with seventeen joints, the first not so long as broad, the third twice as long as broad, the remainder about three times as long as broad; the pinnule is much more slender than the corresponding pinnule in the other species of the genus, and is nearly smooth, the distal edges of the joints in the terminal portion projecting only very slightly; P_3 7 mm. long, similar to P_2 but very slender, the joints distally proportionately somewhat longer; following pinnules more slender still, about 5 mm. long with fifteen joints, and flexible, gradually decreasing in length to 4 mm. and increasing again to 8 mm. distally.

FAMILY TROPIOMETRIDÆ.

GENUS ASTEROMETRA A. H. Clark.

Asterometra mirifica sp. nov.

Antedon longicirra (part) (not of Carpenter) 1893. BELL, Journ. Linn. Soc. (Zool.) vol. 24, p. 339.

Type.—Cat. No. $\frac{8658}{9}$, Indian Museum; Sahul Bank, in $10^{\circ} 30'$ S. lat., 125° E. long.

While in general similar to *Asterometra longicirra*, this species may be at once distinguished by the presence of a high sharp median keel on the 1 Br series and on the first two brachials.

***Asterometra acerba* sp. nov.**

Antedon longicirra (part) (not of Carpenter) 1893. BELL, Journ. Linn. Soc. (Zool.), vol. 24, p. 339.

Type.—Cat. No. $\frac{86.58}{9}$, Indian Museum; Sahul Bank, in $10^{\circ} 30'$ S. lat., 125° E. long.; collected by Capt. F. Worsley of the cable S. S. *Sherard Osburn*.

In general this species comes nearest to *A. anthus* of the Eastern Sea, but it is a more slender species and possesses ten arms only.

Cirri xx, 84–90, 55 mm. long, more slender than those of *A. anthus*.

Radials with a moderately prominent dorso-ventrally elongate median tubercle; 1 Br series with a faint narrow low median carination.

Ten arms 80 mm. long, slightly more slender than those of *A. anthus*, with slightly longer brachials; arms strongly compressed distally as in that species, but the overlapping spines developed on the brachials are not nearly so long or stout.

Pinnules much longer than those of *A. anthus*, and more slender, with proportionately longer joints, those in the terminal portion being three times as long as broad or even longer whereas in *A. anthus* they do not exceed twice the length: P_1 is 7 mm. long with twelve joints; P_2 similar, 7.5 mm. long; P_3 slightly stouter 8 mm. long; P_5 9 mm. long; distal pinnules 13 mm. long.

FAMILY THALASSOMETRIDÆ.

SUB-FAMILY THALASSOMETRIDÆ.

GENUS CROTALOMETRA A. H. Clark.

***Crotalometra sentifera* sp. nov.**

Type.—Cat. No. Z. E. V. $\frac{30.91}{7}$, Indian Museum; $10^{\circ} 47' 45''$ N. lat., $72^{\circ} 40' 20''$ E. long.; 703 fathoms.

This new form is most nearly related to *C. magnicirra* and *C. rustica*; while of the same arm length or even somewhat larger than the latter (150 mm. to 160 mm. arm length) it is more slender, the arms are fewer in number (twelve to sixteen), the cirri are shorter and less stout with fewer joints (xx, 59–62, 50 mm. long), and the brachials after the proximal third of the arm bear long overlapping spines which are more or less flattened dorso-ventrally and rounded or truncated at the tip.

GENUS THALASSOMETRA A. H. Clark.

***Thalassometra attenuata* sp. nov.**

Type.—Cat. No. Z. E. V. $\frac{30.91}{7}$, Indian Museum; $22^{\circ} 24' 00''$ N. lat., $66^{\circ} 51' 30''$ E. long.; 765 fathoms.

This very slender species appears to be related to *T. pergracilis*, but is much more delicate even than that species.

Centro-dorsal conical, the sides slightly convex, 3 mm. broad at the base and 2 mm. high, the cirrus sockets arranged in ten columns of usually two each, the pairs of columns usually slightly separated radially by a shallow furrow or a coarsely tubercular ridge.

Cirri xx, 62-71, elongated and very slender, 50 mm. long, the longest joints being twice as long as broad, or slightly longer, those after about the twenty-fifth being slightly broader than long; joints after the seventeenth or twentieth with the distal dorsal edge produced into a serrate ridge which soon gives place to small carinate dorsal spines.

Ends of the basal rays visible as small, though rather prominent, tubercles in the angles of the calyx; radials just visible or entirely concealed, sometimes bearing on the dorsal surface a row of small tubercles; 1 Br₁ very short, widely chevron-shaped, the proximal and outer third of the distal edge somewhat everted and the distal lateral angles more or less produced; 1 Br₂ (axillary) triangular, twice as broad as long, the anterior edges somewhat everted, the lateral angles more or less produced; 11 Br₃ (3 + 4), developed in two out of six specimens, the lateral edges of the component joints more or less produced.

Ten to thirteen arms 80 mm. to 90 mm. long, exceedingly slender, having in general more the appearance of those of some slender antedonid than of those of a thalassometrid; first brachial short, wedge-shaped, twice as long exteriorly as interiorly, basally united interiorly, the anterior and posterior edges slightly thickened, the lateral edges somewhat produced, and the antero-lateral angles, both interior and exterior, more or less produced; second brachial similar in size and shape; third and fourth brachials (syzygial pair) usually slightly longer interiorly than exteriorly, half again as broad as, to about as broad as, long; next three or four brachials approximately oblong, twice as broad as long, then becoming triangular, as long as broad, distally slowly increasing in length and becoming wedge-shaped, being twice as long as broad in the outer part of the arm; synarthrial tubercles rather prominent; 1 Br series and first two brachials smooth dorsally or with a few small low inconspicuous tubercles, usually with slightly spinous lateral borders; following brachials with the dorsal surface studded with very fine short spines or sharp tubercles, which in some specimens are nearly obsolete; at about the end of the proximal fourth of the arm the brachials begin to develop prominent longitudinal striations which increase in frequency and height distally. The proximal oblong brachials have the proximal and distal ends somewhat prominent; after about the twentieth brachial the distal edges begin to overlap, and in the distal portion of the arm the brachials have the distal portion somewhat expanded, giving approximately the same "dice-box" appearance characteristic of the terminal portion of the arms in the Antedonidae.

The pinnules are essentially as in other species of the genus; but the first three pinnules on each side of the arm are very strongly carinate.

SUBFAMILY CHARITOMETRINÆ.

GENUS PACHYLOMETRA A. H. Clark.

Pachylometra invenusta sp. nov.

Type.—In collection of Indian Museum; $11^{\circ} 46' 30''$ N. lat., $93^{\circ} 16' 00''$ E. long.; 569 fathoms.

This species is in general similar to *P. macilenta*, but differs in many details.

Cirri XXIII, 20–21, 30 mm. to 34 mm. long, rather slender as in *P. macilenta*; the proportions of the joints are the same as in that species, but the distal edges of the joints are slightly more thickened, giving the cirri as a whole a somewhat rougher appearance.

Twelve arms (in the type) 170 mm. long, slender, as in *P. macilenta*: the two n Br series are 4 (3+4); the ornamentation of the 1 Br and n Br series is as in that species; 1 Br series, first two brachials exteriorly and first three interiorly, in close apposition and sharply flattened laterally, the apposed edges somewhat everted; brachials with the same proportions as in *P. macilenta*; but the proximal sub-quadrangular brachials have the distal ends thickened and everted, and the remaining brachials have rather prominently overlapping distal edges. The distal intersyzygial interval is four or five oblique muscular articulations.

The pinnules resemble those of *P. macilenta*, but the genital pinnules are somewhat more swollen than in that species.

FAMILY ANTEDONIDÆ.

GENUS PSATHYROMETRA A. H. Clark.

Psathyrometra gracillima sp. nov.

Type.—Cat. No. $\frac{307}{7}^{90}$, Indian Museum; $19^{\circ} 35'$ N. lat., $92^{\circ} 24'$ E. long.; 272 fathoms.

This species is even smaller and more delicate than *P. mira*, heretofore the smallest known species of the genus.

Centro-dorsal sharply conical, 4 mm. broad at the base and 2.5 mm. high, separated into five radial areas by five interradsial furrows which are somewhat broader than the adjacent cirrus sockets; eight to ten well separated cirrus sockets in each radial area, arranged approximately in four columns, though apparently more or less irregular.

Cirri XI–L, about 25, 35 mm. long, slender, smooth and delicate.

The ten arms which, except for their slenderness, resemble those of related species, are about 100 mm. long.

GENUS TRICHIOMETRA A. H. Clark.

Trichometra obscura sp. nov.

Type.—Cat. No. Z. E. V. $\frac{2189}{7}$, Indian Museum; $7^{\circ} 17' 30''$ N. lat., $76^{\circ} 54' 00''$ E. long.; 430 fathoms.

Centro-dorsal conical, the sides slightly convex, 3.50 mm. broad at the base and 3 mm. high.

Cirri lacking.

Radials even with the edge of the centro-dorsal; 1 Br₁ very short and band-like, not quite in contact basally, the lateral edges diverging at a rather broad angle; 1 Br₂ (axillary) almost triangular, slightly broader than long, the anterior and lateral angles rather strongly produced, with a rounded posterior process incising the 1 Br₁.

The ten arms resemble those of the other species of the genus so far as can be judged from the single mutilated specimen. The longest stump measures 9 mm. to the tenth brachial.

FAMILY PENTACRINITIDÆ.

GENUS HYPALOCRINUS A. H. Clark.

Hypalocrinus lilifaceus sp. nov.

Type.—In collection of Indian Museum; 16° 25' 00'' N. lat., 93° 43' 00'' E. long.; 463 fathoms.

Hypalocrinus lilifaceus is most nearly related to *H. springeri*; the internodals are usually twelve to fourteen in number; II Br 4 (3+4); III Br 2; the elements of the division series and the lower brachials are not strongly everted as in *H. springeri*, but are rather prominently overlapping, this overlap forming a rather sharp point on the side of the brachial which bears the pinnule; this character gradually dies away after the proximal third of the arm, disappearing almost entirely in the outer half. The first syzygy occurs between the second and third brachials as in *Capillaster*.

FAMILY BOURGUETICRINIDÆ.

GENUS BATHYCRINUS Wyville Thomson.

Bathycrinus woodmasoni sp. nov.

Type.—Cat. No. 8³/₇ Indian Museum, from 6° 18' lat., 90° 40' E. long.; 1,520 fathoms.

This species is nearest to *B. equatorialis* from between the Marquesas Islands and Central America, 2,320 fathoms, but, though considerably larger, it is of a more delicate build.

The type specimen consists of a stem lacking the topmost columnars.

Stem (without proximal portion) smooth and slender, enlarging very gradually toward the root, the distal columnars with the articulations not especially swollen, the radicular cirri confined to the terminal columnar; length 327 mm., with one hundred six columnars. Topmost columnar present twice as long as broad, the following increasing to two and one-half times as long as broad on the fourth, then more gradually to three times as long as broad on the fourteenth, and nearly four times as long as broad on the twenty-third and following; length very slowly decreasing after above the fiftieth, the fourteenth from the distal end (root) and following being as long as broad; last seven or eight with the articulations slightly swollen; periphery of the articular faces finely marked with radiating lines except at the ends of the transverse ridge; proximal columnars quite cylindrical, the articulations becoming slightly enlarged after the thirtieth; squarish lower joints slightly constricted centrally as in those species of *Phizocrinus* which have squarish columnars; radicular

cirri stout, but only the bases preserved. The topmost columnars are 1 mm. long by 0.5 mm. in diameter; those in the middle of the stem are 4 mm. long by 1 mm. in diameter, while the squarish ones at the distal end are 2 mm. long; the last seven or eight are 3 mm. long with oval ends the faces of which measure 3 mm. by 1 mm., the two faces of each columnar being approximately at right angles to each other.

Bathycrinus paradoxus sp. nov.

Type.—Cat. No. 7679, Indian Museum; Bay of Bengal; 1,300 fathoms.

The material consists of two broken specimens; one stem, apparently lacking merely the topmost discoidal columnars, 67 mm. in length (thirty-eight columnars), broken into five parts; part of a larger stem, including the root and twenty-one columnars, and a crown without the distal portion of the arms probably belonging to the latter.

Nearest to *B. recuperatus* (Perrier).

Stem very slender; longest columnars of smaller stem 2.5 mm. in length; of larger stem 3 mm.; columnars of middle of larger stem 0.7 mm. broad at the ends, 0.4 in the middle.

Basals five, not ankylosed, forming a basal ring which expands slightly anteriorly, and is about as long as the breadth at the top of the stem; radials forming a ring expanding rather rapidly outward from the basals, the sides evenly concave, two and one-half times as broad distally as proximally, half again as broad distally as long; 1 Br₁ trapezoidal, nearly twice as long as broad proximally; 1 Br₂ trapezoidal, nearly twice as broad as long.

Arms ten, all broken off near the base, smooth, apparently similar to those of other species of the genus; 1 Br and lower brachials with a broad thin produced border; distal two-thirds of the 1 Br₁ and the following joints with a sharp median keel.

